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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Connection Mouthpiece with Valves for Bottles of Liquid Gas

We, GURTNER S.A., a French Joint Stock Company, of 44 Rue Laugier, Paris (Seine), France, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a connecting mouthpiece with valves, with a multiple safety device for containers of liquid gas, at least one of which valves is controlled by the axial displacement of a pushrod provided in the connecting socket which can be fitted to the mouthpiece.

This safety device can also be applied to other closure members for example cocks and gate valves and in general to any manually operated system for opening and closing a passage for gaseous fluid.

Connecting mouthpieces of known type, to which the invention is applied, comprise a body in which is provided an axial passage with a gas inlet orifice and a gas outlet orifice. The passage has two successive seats one of which co-operates with a shut-off closure member situated on the outlet orifice side and the other with a safety closure member situated on the inlet orifice side. This safety member and its seat together constitute a safety device for limiting the flow of gas. It is normally kept open and will not close to provide automatic escape of gas except when the flow rate rises considerably above a predetermined maximum value.

The direction of closure for the two valves thus formed is towards the outlet orifice, and the two closure members can separately take up their positions of opening and closing. The shut-off closure member is urged in the sense of closure by a spring and is situated so that it can be lifted from its seat by the axial displacement of a pushrod provided in a connecting socket which can be fitted to the end of the mouthpiece containing the outlet orifice.

The connecting mouthpiece according to the invention is characterised by the fact that a calibrated spacer spring is assembled under compression between two closure members. A supporting member urged by a spring in the direction of the outlet orifice is movably mounted in the passage so that it can bear against the safety closure member and urge it in the sense of closure and so that it can be moved away by the shut-off closure member when the latter is in the open position.

The force of this spring is greater than that of the spacer spring. Finally, the safety closure member comprises a calibrated duct which connects the spaces situated on the upstream and downstream side of this closure member.

One embodiment of the connecting mouthpiece according to the invention will now be described by way of example with reference to the appended drawings in which

Figures 1 to 4 show, in sectional view, a mouthpiece in which the closure members are shown in their different positions.

The connecting mouthpiece shown is screwed with its axis vertical to a bottle of liquid gas such as butane or propane; this bottle is not shown. The connecting socket of an expansion cock and its pushrod acting on the shut-off closure member are also not shown.

In the description given hereinafter, the position of the elements constituting the mouthpiece is defined with respect to the vertical position in which it is fitted to the bottle. However, it is to be understood that the connecting mouthpieces according to the invention can also be used in any other position.

The body 1 of the mouthpiece shown has a screw threading 2 on its lower part by means of which it is screwed into the mouth of the bottle. The connection can be tightened with

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the aid of a hexagonal flange 3 which also ensures a tight seal by means of a packing (not shown). A circular groove 4 in the upper cylindrical part 5 of the mouthpiece forms a retaining housing for one or more locking balls provided in the connecting socket of the expansion cock which covers this cylindrical part.

An axial passage 6 extends right through the body 1; it comprises, from above downwards, a housing 7 for a spigot provided in the connecting socket of the expansion cock, the valve seat 8 of a shut-off valve 9 and the valve seat 10 of a safety valve 11. A fixed perforated disc or cap 12 having an axial aperture 13 is fixed in the lower part of the axial passage.

The shut-off valve 9 is provided on its lower surface with a blind axial bore in which engages the upper end of an axial rod 14 which extends through a bore 15 in the safety valve 11, through a central aperture in a cup 16 and through a washer 17 and its lower end passes through the axial aperture 13 of perforated cup 12.

The axial rod 14 has three parts decreasing in section from above downwards. The part 18, which has the largest diameter, extends through the safety valve 11. A part 19 of smaller diameter extends through the cup 16 and a part 20 of still smaller diameter extends through the washer 17. A first shoulder 21 for the washer 17 is thus formed between the parts 19 and 20 and a second shoulder 22 for the cup 16 is formed between the parts 18 and 19.

A first compression spring 23 is assembled under compression between the washer 17 and the fixed cup 12. A second compression spring 24 is assembled under compression between the two valves 9 and 11, its ends engaging in annular grooves provided respectively in the lower surface of the shut-off valve 9 and in the upper surface of the safety valve 11 a third compression spring 25 is assembled under compression between the fixed cup 12 and the cup 16.

The first spring 23 is not accurately calibrated. Its force is merely limited to ensure that the shut-off valve 9 can be lifted from its seat by the thrust exerted by the pushrod of the connecting socket.

The third spring 25 is also not calibrated with precision. Its purpose is merely to keep the safety valve 11 closed. Its force is merely limited so that the pushrod of the connecting socket acting on the shut-off valve 9 can compress the third spring and move the cup 16 away from the lower surface of the safety valve 11 by means of the axial rod 14 and its shoulder 19. In other words, for a certain open position of the shut-off valve 9, the thrust exerted by the third sping 25 is eliminated.

The force of the second spring, that is to say of the spacer spring 24 is of a precise, low value chosen as a function of the minimum pressure provided on the upstream side of the mouthpiece and a function of the closure section provided by the safety valve 11.

Owing to the fact that it is placed between these two valves, the spring tends to move the safety valve 11 from its seat. If the thrust of the third spring 25 which ensures closure of the safety valve is not eliminated, it is necessary for this thrust to be superior to that exerted by the spring 24 so that the safety valve 11 remains on its seat.

A small passage is always provided between the spaces situated on the upstream and downstream side of the safety valve 11. In the embodiment shown in the drawings, this calibrated passage is provided by the play existing between the axial rod 14 and the bore which allows the passage of this rod through the safety valve 11. The object of providing this flow of gas is to ensure that when the safety valve 11 is closed, the pressure of the valve member on its seat will not be modified whatever the variations in pressure prevailing on the upstream side, that is to say in the bottle.

It is to be understood that sealing means such as annular packing glands, for example, may be provided between the valves and their seats or between the connecting mouthpiece and the distributor device fitted to it. The connecting mouthpiece according to the invention operates as follows:

When the pushrod of the connecting socket or, more generally speaking, of the distributor device does not act on the shut-off valve 9, the movable elements of the connecting mouthpiece are in the positions shown in Figure 1.

The opening of the shut-off valve, that is to say the lowering of the valve member by the pushrod of the connecting socket, eliminates, with a certain delay, the thrust exerted by the third spring 25 on the safety valve 11. The pressure on the downstream side of the latter is cancelled on expansion into the body of the expansion system and into the tubing and thus produces a positive pressure difference between the upstream and downstream side of this valve, maintaining the valve 11 on its seat 10 in spite of the action of the second spring 24 which urges it in the direction of opening (Figure 4).

In the case where the utilisation system is perfectly tightly sealed, the zero pressure prevailing on the downstream side of the mouthpiece at the moment when the shut-off valve 9 opens will tend to increase until equilibrium is reached with the pressure on the upstream side of the mouthpiece due to the requisite leakage flow between the rod 4 and the bore 15. The pressure differnence between the upstream and downstream side having been eliminated, the safety valve 11 which is urged in the direction of opening by the second spring 24 will open and thus admit a certain flow

and permit the utilisation of gas to a fixed maximum amount (Figure 2).

In the case where the feed circuit has a slight leakage but greater than the leakage flow of gas between the rod 14 and the bore 15, the zero pressure at the moment when the shut-off valve opens will not be able to equilibrate with the pressure at the upstream side and, since the pressure difference between the upstream and the downstream side remains, the safety valve 11 will remain in position on its seat 10 (Figure 4).

In the event of flow accidentally rising above the fixed maximum, the leakage provided by the annular space between the safety valve 11 and the passage 6 in the body 1 will produce a positive pressure difference between the upstream and downstream side so that the safety valve 11 will be placed on its seat 10 and admit only the slight leakage flow between the rod 14 and the bore 15 (Figure 4).

Finally, when the mouthpiece is used on a bottle of liquid gas, it is sufficient to fit on this mouthpiece a feed tube with a connecting socket having a pushrod capable of engaging more deeply in the mouthpiece to enable the bottle to be filled (Figure 3). This pushrod pushes the shut-off valve 9 sufficiently to enable the latter to bear against the safety valve 11 and keep it from its seat 10.

It will be seen that the choice of the three independent elements, namely the predetermined leakage flow between the rod 14 and the bore 15, the calibration of the second spring 24 and the cross-section of the annular space between the safety valve 11 and the wall of its housing in the passage 6 make it possible to regulate precisely the amount of leakage into the utilisation circuit so that the safety valve 11 remains pressed against its seat 10, the minimum value of the pressure prevailing on the upstream side of the safety valve member 11 for which the safety valve 11 operates in the event of leakage in the utilisation circuit, and finally the value of the maximum flow for which the safety valve member 11 bears against its seat 10.

A judicious choice of these three elements render the operation of this safety valve 11 practically independent of variations in pressure on the upstream side within the limits of the customary utilisation pressures.

By means of this device, which forms the object of the invention, mounted in a connecting mouthpiece, it is possible to obtain:

a) for a single bottle without expansion cock, a safety means limiting the flow of gas to a small amount in the event of partial or complete failure of the shut-off valve;

b) for the part situated at the downstream side, from the connecting mouthpiece, the expansion device or, more generally speaking, the low pressure utilisation part, a safety means limiting the flow to a low value in the event of leakage or if the utilisation apparatus is open or at the moment of opening of the expansion cock;

c) for the part situated on the downstream side starting from the mouthpiece, the expansion part and the low pressure device, a safety means limiting the flow to a small value in the event of a flow above a fixed maximum.

WHAT WE CLAIM IS:—

1. Connecting mouthpiece for gas supply duct, in the body of which is provided an axial passage with a gas inlet orifice and a gas outlet orifice, which passage has two successive seats one of which co-operates with a shut-off closure member close to the outlet orifice and the other with a safety closure member situated at the inlet orifice, the sense of closure for the two valves thus formed being directed towards the outlet orifice, and the two closure members being able to take up separately the positions of opening and closing, whereas the shut-off closure member is on the one hand urged by a first spring in the sense of closure and on the other hand situated so that it can be lifted from its seat by axial displacement of a pushrod provided in a connecting socket which can be fitted to the end of the mouthpiece containing the outlet orifice, the mouthpiece being characterised by the fact that a calibrated spacer spring is assembled under compression between the two closure members, that a supporting member urged by a third spring in the direction of the outlet orifice is movably mounted in the said passage so that it can bear against the safety closure member, urging it in the sense of closure, and that it can be moved away from this closure member by the shut-off closure member when the latter is in the open position, the force of the third spring being greater than that of the spacer spring, the safety closure member having a calibrated passage connecting the spaces on the upstream and downstream side of this closure member.

2. Connecting mouthpiece according to claim 1, characterised in that the shut-off closure member is urged in the direction of closure by way of an axial rod extending through the safety closure member, sliding in the latter and forming a first shoulder against which one end of a first spring bears either directly or by way of a washer, the other end bearing against a perforated base fixed on or in the inlet orifice.

3. Connecting mouthpiece according to claim 2, characterised in that the supporting member is a disc in which slides the axial rod which forms a second shoulder arranged so that it abuts against the said disc and spaces it from the safety closure member when the shut-off closure member is pushed by the push rod into the open position beyond a predetermined position inside the body of the mouthpiece, one of the ends of the third spring bearing against the perforated base.

4. Connecting mouthpiece according to

claim 2 and/or 3, characterised in that the said calibrated passage is formed by the play between the axial rod and its housing in the safety closure member.

5. Connecting mouthpiece according to one of the preceding claims, characterised in that the connecting mouthpice comprises a screw threading by means of which it can be fixed to a bottle of liquid fuel gas, the inlet of gas being directed towards the inside of the bottle.

6. Connecting mouthpiece for gas supply duct, substantially as herein described, with reference to the accompanying drawings.

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1,019,524 COMPLETE SPECIFICATION
1 SHEET

Fig. 1

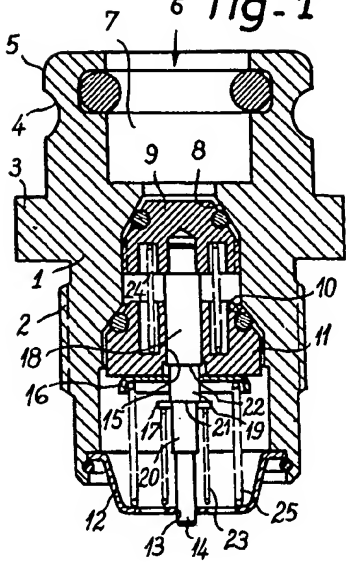

Fig. 2

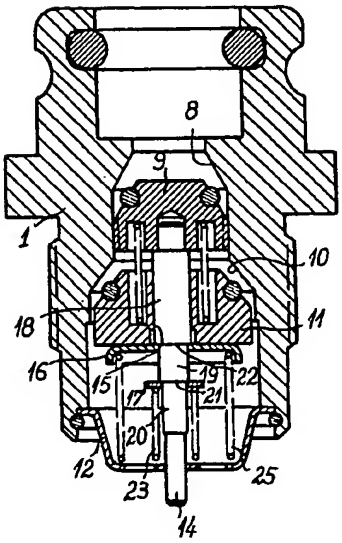

Fig. 3

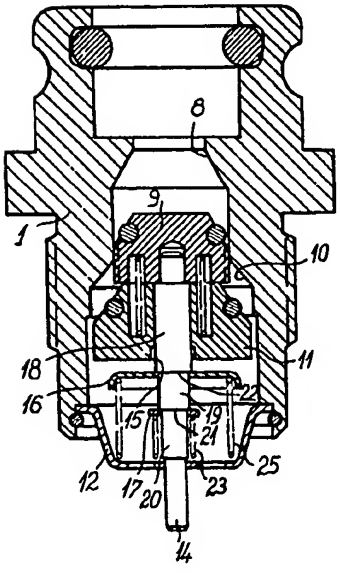

Fig. 4